

# PATENT SPECIFICATION



DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Improvements in and relating to Twin Windscreen Wipers for Motor Vehicles

5 We, ROBERT BOSCH G.M.B.H., of 4, Breitscheidstrasse, Stuttgart W., Germany, a joint Stock Company organised under the laws of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to twin windscreen wipers for motor vehicles, of the kind having a common driving motor for the two wipers, said motor rotating a crank which by way of a linkage in each case drives a reversing gear for each wiper.

15 In known twin windscreen wipers of this kind a crank arm is disposed as a reversing gear on the wiper shaft and the driving linkage acts on its free outer end. Where this simple reversing gear is used the power transmission is effected with a constantly varying lever arm, and in fact the length of the lever arm approaches zero towards the dead centre positions. The arrangement must therefore be so dimensioned that these two dead centre positions are not obtained in operation, and this naturally limits the wiping angle—the angle range covered by the windscreen wipers during wiping—unless a special step-up gear is provided—with addition expense—between the reversing gear and the wiper shaft.

20 Modern windcreens are curved back considerably at the sides, so that the two wipers at their reversal positions situated at the outer edge of the windscreen have to perform in addition a rocking movement vertically to the swinging movement. This additional movement occurs when the wiper enters the curved region of the windscreen, under the spring force of the wiper arm which is so arranged and constructed that it tends to press the wiper blade against the windscreen. On the return path, that is just after the reversal of the wiper blade, this additional movement takes place against the spring force. Consequently, 45 when the wiper moves out of its reversal position

situated in the curved part of the windscreen, the wiper drive is subjected to considerable load. Since precisely during this part of the movement the lever arm, under which the transmission of the drive to the reversing gear is effected, is extremely short in the conventional above-described reversing gears, this additional load on the motor is increased at the corresponding points. Consequently the motor has to be designed with excessive power, in order that there may be sufficient driving power available in this region as well. The excess driving power in the other regions then causes the motor to run at a higher speed outside the range in question and hence causes periodic howling during each wiper movement and apart from the necessary powerful design of the motor this is a great disadvantage owing to the unpleasant noise involved.

Moreover, when the wiper blades are to operate in such a manner that they move towards each other into positions of reversal in the central region of the windscreen and then move away from each other into positions of reversal at the outer regions of the windscreen, it is desirable for the wiping paths of the blades to partly overlap each other, so that the viewing field available to the driver is as continuous as possible.

75 The present invention consists in a twin windscreen wiper arrangement for motor vehicles, comprising two rocker mechanisms for respectively operating two wiper blades, the rocker mechanisms being connected by rigid rods to a crank operable by an electric driving motor common to both wipers, or one of the rocker mechanisms being connected by a first rigid rod to the other rocker mechanism, and the other rocker mechanism being connected by another rigid rod to the crank, the arrangement of the rocker mechanisms and connecting rods being such that the wiper blades are operated in mutually opposite directions with the wiping fields thereof partly 90

overlapping, at least one of the rocker mechanisms being formed as a Tschebyscheff cross-link device, so dimensioned that the wiper blade associated with the said one rocker mechanism has different speeds when moving into and when moving out of its overlapping position.

By a Tschebyscheff cross-link device is to be understood a device comprising a rocker arm pivotally mounted intermediate its length, and connected by links, which are pivotally mounted near its ends, to a longitudinally reciprocable operating rod, the links being crossed and pivotally connected to the operating rod at spaced points thereon.

By virtue of this *per se* known cross-link device the rocker arm through which the power transmission is effected is constant or approximately constant over the entire cycle. In practice, the wiping field situated on the passenger's side may be a few angle degrees smaller, without noticeably restricting the visibility of the driver.

The above-mentioned disadvantages thus occur in such twin windscreen wipers predominantly in the case of the drive of the windscreen wiper situated on the driver's side. The drive of this windscreen wiper is further rendered difficult because a large number of fittings is provided on the driver's side below the windscreen, so that the driving motor for the wiper generally cannot be fitted on this side. Since there is accommodation for the driving motor only on the passenger's side, it is customary in such cases to connect the wiper situated on the passenger's side directly by a rod to the motor crank of the drive, so that this wiper is driven directly by the motor. For the other wiper in such cases the drive is effected by a rod which acts on a separate lever of the reversing gear for the wiper situated on the passenger's side and by its free end drives the reversing gear of the second wiper. With this type of drive necessitated by the installation conditions and the installation room available, for the wiper situated on the driver's side, two facts afford additional difficulties for the drive of the wiper on the driver's side. The first difficulty consists in the already mentioned fact that the wiping field situated on the driver's side should be as large as possible. The second difficulty is due to the fact that the drive of the wiper situated on the driver's side is effected through the reversing gear of the other wiper, so that the play of the interposed reversing gear additionally has an adverse effect on the drive of the wiper situated on the driver's side. For this reason, it has proved advantageous for the rocker mechanism operating the wiper situated on the driver's side to be formed as a Tschebyscheff cross-link device and for the other rocker mechanism to comprise an angular lever one arm of which is linked to the crank by the said other rigid rod. Both rocker

mechanisms may be formed as Tschebyscheff cross-link devices, the rocker arm of one of the said devices being connected by the crossed links thereof to the said first rigid rod, which in turn is connected to the rocker arm of the other of the said devices, the rocker arm of the said other device being connected by the crossed links thereof to the said other rigid rod.

In some cases the installation conditions enable the driving motor to be disposed between the two wiper arm shafts. In such cases it is advisable for each of the two reversing gears to be driven by way of a separate rod, which is articulated by its free end on the motor crank. In such a case, moreover, either only the rocker mechanism situated on the driver's side is constructed as a Tschebyscheff cross-link device or else such devices are provided for both rocker mechanisms.

It has been proved very advantageous to use Tschebyscheff cross-link devices as rocker mechanisms in twin windscreen wiper installations, when these windscreen wiper installations are equipped with a *per se* known parking stop position or widened parking stop position, that is to say a device which independently of the time of operation of the main switch automatically switches off the wiper arm movement only when the windscreen wipers are in a position in their wiping range which obstructs visibility as little as possible. In the case of the widened parking circuit this mechanism is so constructed in manner known *per se* that after reaching the parking stop position the wipers perform an additional movement which moves them beyond the edge of the wiping field and only then allows them to stop. In the case of the widened parking stop position, especially, for the purpose of putting the wipers into operation again it must be possible to transmit the driving power to the wipers sufficiently even in this extreme angle position, and for this purpose the Tschebyscheff cross-link device in which the length of the lever arm is independent of the angle position of the wiper is again a suitable solution for the construction of the rocker mechanism.

It will be appreciated that by suitable dimensioning of the cross-link device, when only a single such device is used, the wiper blade which lies lowermost when the blades are in their innermost wiping positions is moved out of the said innermost position at a slower speed than its speed of movement into the innermost position. This means that the other wiper blade, conventionally driven, can be moved into and out of its innermost wiping position without colliding with the said lowermost blade.

When two cross-link devices are used, the arrangement is such that the wiper blade which lies uppermost when the blades are in their innermost wiping positions is moved out

of the innermost position at a faster speed than its speed of movement into the innermost position, while the wiper blade which is lowermost when the blades are in their innermost wiping positions is moved into such innermost position at a faster speed than its speed of movement out of the said innermost position.

The invention will now be described in greater detail with reference to the accompanying drawing, which illustrates by way of example two embodiments thereof; and in which:—

Figures 1a and 1b are a plan view and partial cross-section respectively of a Tschebyscheff cross-link device as a reversing gear for windscreen wipers according to the invention; and

Figures 2 and 3 are a driver's view (left-hand drive) of two embodiments of windscreen wiper according to the invention.

With reference to Figure 1, reference 1 denotes a rod which is driven at its free end (not shown), so that it performs oscillating movements in its longitudinal direction. Two links 2 and 3 are articulated on the rod 1 and are disposed crosswise and are articulated by their two free ends on the two free ends of the rocker arm 4. The arm 4 is fitted rigidly at its centre on the wiper arm shaft 5. On reciprocation of the rod 1 the shaft 5 performs oscillating rotary movements under the action of the cross-link device 2, 3, 4. The distance between the shaft 5 and the rod 1 remains substantially constant, given suitable dimensioning of the cross-link device. The consequence is that the power transmission from the rod 1 to the shaft 5 is always effected by way of the same rocker arm independently of the angular position of the arrangement.

In Figure 2, reference 11 denotes a rod which is articulated by its free end 12 on a motor crank driven by a driving motor (not shown). The end 12 describes the path 13 shown in chain-dotted lines, during operation. The other end of the rod 11 is articulated on the end of an angle lever 14 the angle of which is fastened on the wiper arm shaft 15. At the free end of the second side of the angle is disposed the rod 16 which at its other end is connected by crossed links 17, 18 to a rocker arm 20 which is in turn fastened on the wiper arm shaft 19 of the second windscreen wiper. This second windscreen wiper is situated on the driver's side and covers a wiping range which is a few degrees larger than the windscreen wiper on the passenger's side.

The mode of operation of the arrangement is as follows: The driving motor imparts oscillating movements to the rod 11 and drives

the angle lever 14 with an oscillatory movement and hence the windscreen wiper on the passenger's side. By way of the second limb of the angle lever 14, the rod 16 and the crossed links 17, 18, the rocker arm 20 and thus the wiper on the driver's side is simultaneously driven with an oscillatory movement. The arrangement is at the same time such that the two wipers wipe in opposite directions, that is to say they are situated at the outer end of the windscreen at the same time and meet in the centre of the windscreen.

Figure 3 shows a windscreen wiper substantially the same as that shown in Figure 2, except that instead of the angle lever 14, it has a cross-link device having a rocker arm 20<sup>1</sup> which is linked by crossed links 17<sup>1</sup>, 18<sup>1</sup> to a connecting rod 11<sup>1</sup>. In this embodiment the movement of the wipers is similar to that of the wipers of Fig. 2.

#### WHAT WE CLAIM IS:—

1. A twin windscreen wiper arrangement for motor vehicles, comprising two rocker mechanisms for respectively operating two wiper blades, the rocker mechanisms being connected by rigid rods to a crank operable by an electric driving motor common to both wipers, or one of the rocker mechanisms being connected by a first rigid rod to the other rocker mechanism, and the other rocker mechanism being connected by another rigid rod to the crank, the arrangement of the rocker mechanisms and connecting rods being such that the wiper blades are operated in mutually opposite directions with the wiping fields thereof partly overlapping, at least one of the rocker mechanisms being formed as a Tschebyscheff cross-link device, so dimensioned that the wiper blade associated with the said one rocker mechanism has different speeds when moving into and when moving out of its overlapping position.

2. A windscreen wiper arrangement as claimed in claim 1, wherein the other rocker mechanism comprises an angular lever one arm of which is linked to the crank by the said other rigid rod.

3. A windscreen wiper arrangement as claimed in claim 1, wherein both rocker mechanisms are formed as Tschebyscheff cross-link devices, the rocker arm of one of the said devices being connected by the crossed links thereof to the said first rigid rod, which in turn is connected to the rocker arm of the other of the said devices, the rocker arm of the said other device being connected by the crossed links thereof to the said other rigid rod.

4. A twin windscreen wiper arrangement substantially as herein described with reference to Figs. 1 and 2 or Figs. 1 and 3 of the accompanying drawing.

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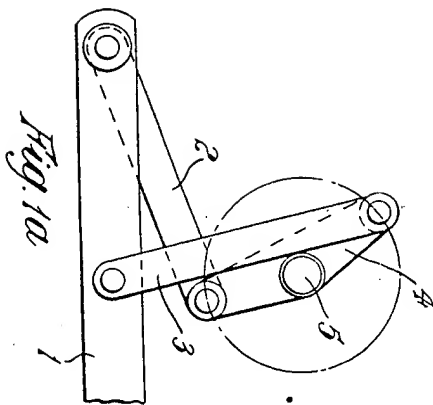


Fig. 1a

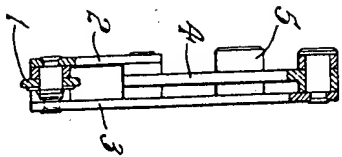


Fig. 1b

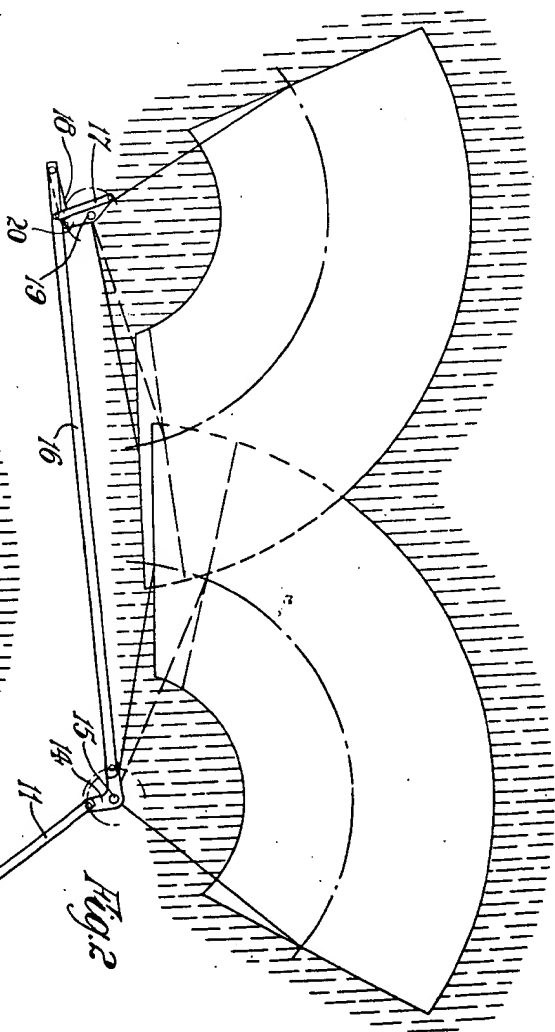


Fig. 2

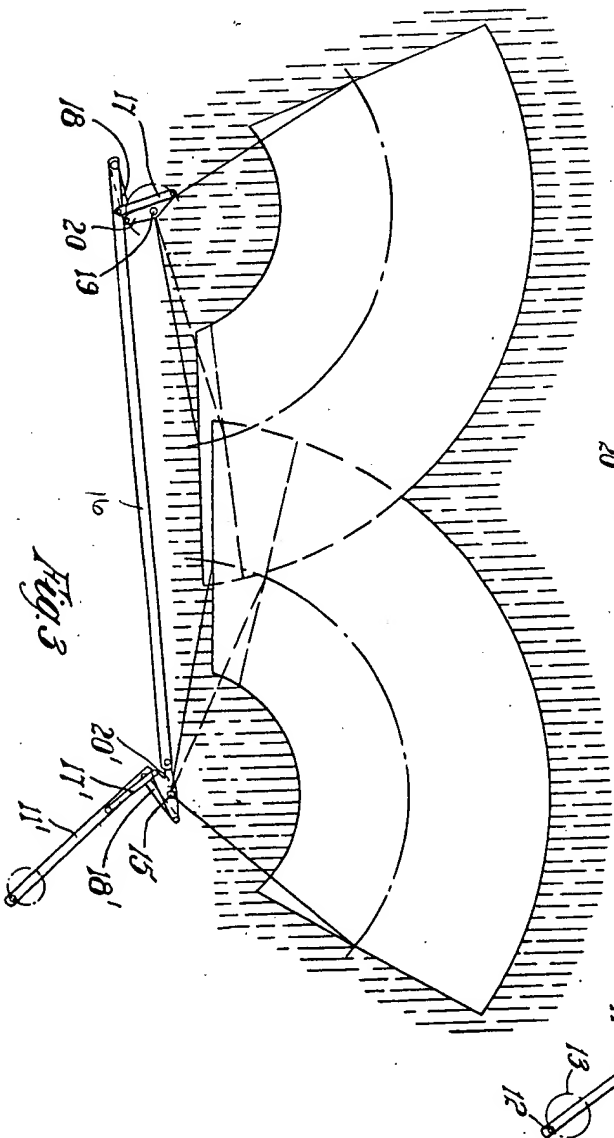


Fig. 3